REMARKS

This response follows a Final Office Action of January 10, 2002, rejecting claims 1-7. The claim objections and rejections under 35 U.S.C. § 112, second paragraph have been dealt with by appropriate claim changes. The Applicant, however, respectfully submits that claim 6 is sufficiently dependent because the requirement there is merely one that the injection cross section is arranged at a distance from the throat that is substantially less than a distance of a location of spontaneous separation of the flow. While the Examiner is correct that the determination of the location of spontaneous flow separation is dependent on other variables, that alone does not rendered the claim indefinite. Rather, irrespective of those variables, the claim simply requires that with respect to that distance, wherever it is, the injection cross section is arranged at a distance from the throat which is substantially less. The issue then is not the indefiniteness of the claim but rather, its reliance on a perimeter that may rely on other physical properties. That alone does not rendered the claim indefinite. For example, a claim may simply require that the height of the eraser protruding from the end of pencil is substantially less than the length of the pencil itself. While there is no data as to whether the pencil is six inches long or six feet long, the only requirement is one comparatively relative to the length of the eraser. Same here, and thus it is believed that the rejection to claim 6 should now be removed.

The Applicant has cancelled claim 1 and introduced new claim 8, which is substantially the same as claim 1, but provides in a more direct sense that the system has a device for simultaneously injecting fluid through separation triggering elements of one injection cross section. Those separation triggering elements are mutually spaced by a distance that is sufficient for generating from mutually spaced initiation points in the nozzle body distinct zones of jet

separation to form a three-dimensional separation of the flow. That requirement, namely a plurality of separation triggering elements to simultaneously generate from mutually spaced initiation points positioned on the divergent nozzle body distinct zones of jet separation to form a three-dimensional separation of the flow as previously found in claim 1. Applicant refines claim 1 here by specifying at least two mutually spaced separation triggering elements, as opposed to the previously defined "a plurality of separation triggering elements". The Applicant also defines here that those elements are positioned "on at least one injection cross section that is perpendicular to the nozzle axis". The Applicant also claims "an injection device for simultaneously injecting fluid through at least the at least two separation triggering elements of one injection cross section".

The prior art cited by the Examiner, including the newly cited references to Fuentes, Osburn, and Howell relate to systems that modify the direction of the thrust. In contrast, Applicant's claim system controls the jet separation of the flow in the nozzle without affecting the direction of the thrust. Applicant requires that the control of the jet separation is parallel to the nozzle axis.

Applicant distinguishes his invention over Rannie because the reference relates to a passive secondary injection device. Reference is made to the present application on page 2, lines 18-24, page 3, lines 24-31 dealing with experiments conducted on a corresponding device that is a RL 10 engine. Rannie is the result of experimental research on a passive secondary injection for flow separation control for that engine. This is acknowledge prior art which is not considered pertinent. Reference for example is made to page 2, lines 18-24. That work preceded Rannie.

The Examiner should note the very large porosity of the nozzle. That is, the slots of a very large size compared to that of the nozzle. Figures 4, 5, 6 and 7 are typical of a passive venting design. This configuration requires a reduction in the pressure drop across the injection orifice. With passive venting, the secondary mass flow rate tends to be large because the secondary gas is not stored on board the rocket. The injection is not localized on a point but rather, spread over wide slots.

As discussed in the specification on page 3, lines 24-31, the disadvantages of this solution as proposed by Rannie result in a nozzle which is unduly complex and a prohibitive weight.

Mueller is close to Rannie by comparing Figures 8 and 9. Here, a two-dimensional separation control of injection occurs through a multitude of small port holes. Both patents are aligned in that there is no teaching whatsoever of a three-dimensional aerodynamic flow in the nozzle, which is beneficial to separation control. The references do not provide structure or teaching of an intentional three-dimensional flow within the nozzle to achieve distinct zones of jet separation.

Not structure

Thus, it is believed that by this response the Applicant has amended the claims in a manner to eliminate all of the rejections set forth by the Examiner and provide positive structural features that distinguish the invention over the prior art. Should the Examiner have any questions, he is requested to contact the undersigned attorney of record at the local exchange listed below.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

for Neil B. Siegel
Registration No. 25,200

SUGHRUE MION, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: April 10, 2002

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 1 is canceled.

The claims are amended as follows:

2. (Twice Amended) ~~The~~ A rocket engine nozzle as clamed in claim ~~1~~ 14, wherein the separation triggering elements comprise injection orifices positioned for injecting fluid through a wall of the nozzle body at least one injection cross section~~,~~ which is disposed substantially perpendicular to the wall of the nozzle body, at least two independent injection orifices being distributed over the perimeter of the wall of the nozzle body, each injection orifice constituting a discrete separation triggering element inducing a distinct zone of jet separation.

3. (Twice Amended) ~~The~~ A rocket engine nozzle as claimed in claim 2, wherein the injection orifices are uniformly distributed over the perimeter of the wall of the nozzle body.

4. (Twice Amended) ~~The~~ A rocket engine nozzle as claimed in claim ~~8~~ 14, wherein the nozzle body is conical and the injection orifices comprise at least two which are symmetrically positioned around the circumference of said nozzle.

5. (Twice Amended) ~~The~~ A rocket engine nozzle as claimed in claim 3, wherein the injection orifices comprise 3 in number and are arranged at substantially 120° to one another over the perimeter of the nozzle body.

6. (Twice Amended) ~~The~~ A rocket engine nozzle as claimed in claim 2, wherein said injection cross section is arranged at distance D from the throat which is substantially less than a distance D_0 of a location of spontaneous separation of the flow at sea level.

7. (Twice Amended) ~~The~~ A rocket engine nozzle as claimed in claim 6, wherein the injection device comprises a plurality of injectors situated at different distances from the throat, and a disturbing device for selectively feeding said injectors at different cross sectional locations to take into account the variation of said distance of spontaneous of the flow as a function of altitude.

Claim ~~8~~ 14 is added as a new claim.